SELF-FUNDED PHD OPPORTUNITY
Using Unmanned Aerial Vehicles (UAVs) for Mapping Hydromorphology and Hydraulic Habitat
Hydromorphology is synonymous with physical habitat in rivers and describes the combination of
the morphological and hydrological / hydraulic components of river channels. It is one of the key
drivers influencing the structure and function of aquatic communities. However, due to a long
history and widespread extent of humans altering channel morphology for flood mitigation and weir
creation and altering flows for abstraction and dam construction, hydromorphology is often in a
degraded state.
In order to assess current river health, often driven by legislative needs, e.g. the EU Water
Framework Directive, and also to assess the impact of remedial works through river restoration,
hydromorphological assessment is required. Traditional methods of assessing the morphology and
hydraulics of rivers has often used either rapid subjective visual assessment from the bankside which
is prone to surveyor variability or detailed and intensive manual data collection of water depths and
velocities with instruments in direct contact with the river, including dGPS, total stations, current
meters and Acoustic Doppler Current Profilers.
In recent years, drones or Unmanned Aerial Vehicles (UAVs) have gained increasing use as a non-contact and rapid means to assess river hydromorphology and surface flow velocities. Their benefits
include access to parts of the channel that may be inaccessible on foot and the ultra-high-resolution
data they can create through the collection of overlapping imagery and the use of Structure-from-Motion (SfM) photogrammetry. This has been used by River Science researchers within the
Sustainable Environments Research Group at the University of Worcester with success in shallow
clear water streams to map channel bed topography or bathymetry. UAV video is also now being
used to map surface flow velocities using Image Velocimetry (IV). Rarely however have these two
items been combined in one study to assess hydromorphological diversity and hydraulic habitat.
This PhD aims to utilise both methods, i.e. SfM for channel bathymetry and IV for surface flow
velocity measurement to test the ability of using UAVs for assessing hydromorphology and hydraulic
habitat under a range of scenarios, including natural, engineered and restored reaches.
Additional fieldwork costs are likely to be in the region of £1000 to cover transport to and from field
sites and field equipment (e.g. survey markers).
Please note, our previous PhD students have sometimes been able to secure additional external
funds to cover some fieldwork costs and/or financial assistance towards conferenen1 (xter)2.3 (c)-(w)-3.(t)-3 (()8.d (c)-1.9 (ial)10.6 (a (xter)Tc 0.0 (u52(s)-1.3 (ld)2.r2 (fe)-3(n)2.3 9 (s)-12 (fe)-3.5 (e)7.10.6 (a (xter.6 (c)-1.9c 0.5u52(3 (o)-2.7 rv)-5.5 (al)10.2.9 (rter)2.3 (d)2.9 (o7)-(w)-3. (re)-3 xter)B9 (od)2r-6.6 (n)2..7 rv)-5 (rter)S (e)-12 (fe)-310.2.9 (ld)2.3 (e)-6.6 (n)2y)-0.012 n)2.2 (an) (e) Ge (c)9 ((f)]TJ

Supervisory Team
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